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THE BABY BREAK: AN ANALYSIS OF SUSTAINED FERTILITY DECLINE AFTER A PERIOD OF ECONOMIC RECESSION

Tyrus Parker

University of New Hampshire, Durham

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Tyrus Parker

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Thesis Director, Kenneth Johnson, Class of 1940 Professor of Sociology, Senior Demographer, Andrew Carnegie Fellow

Rebecca Glauber, Associate Professor of Sociology, Director of Graduate Programs of Sociology

Cliff Brown, Associate Professor of Sociology

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TABLE OF CONTENTS

Abstract

THE BABY BREAK: AN ANALYSIS OF SUSTAINED FERTILITY DECLINE AFTER A PERIOD OF ECONOMIC TURBULENCE

Tyrus Parker

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The United States fertility rate declined sharply during the Great Recession that lasted from 2007-2009. Now a decade removed from the recession, I examine current fertility rates to see if they have rebounded to pre-recession levels. I use 5-year American Community Survey data to compare 2013-2018 fertility rates to 2006-2010 fertility rates at the county level across the United States. Variables such as race, region, education, median household income, the urban-rural continuum and USDA county typologies were analyzed to analyze fertility trends in different types of counties across the country. Fertility declined 9.5% over the observed time period. Counties with high Hispanic populations are experiencing higher fertility declines than White or Black communities. The results of this study indicate that fertility rates are not recovering after the decline that occurred during the Great Recession. Instead, many women are having fewer children than they would in generations before, leading to a faster decline in fertility rates.

INTRODUCTION

The Great Depression is widely considered to be the most devastating economic period of United States history. The United States has experienced thirteen periods of economic recession since then, and the Great Recession that occurred last decade has proved to be the most impactful on the average American life (Pew Research Center 2010). The National Bureau of Economic Research declared that the Great Recession began in December 2007, and ended in June 2009, marking a turbulent 18 months that affected many households across the country (National Bureau of Economic Research 2010). In 2010, total private employment was six percent lower than in December 2007, illustrating how the American public still felt the effects of the recession years after it ended (Eberts 2011). Now, over a decade after the beginning of the recession, most workers have recovered as the economy became more stable (Kalleberg & von Wachter 2017). While the recession was officially declared over economically, key demographic trends such as fertility and migration rates can be examined to ascertain if the country has truly recovered demographically from the economic downturn.

When looking at the lasting impact of the Great Recession, the demographic structure of the country remains altered long after the stock market recovered. A historic stream of rural youth moving to urban areas temporarily halted, leaving many rural youths without the means to make the transition out of their hometowns (Johnson, Kurtis & Egan-Robertson 2017). This rural youth slowdown was caused by rising unemployment and diminished job markets in urban areas that are typical landing spots for this demographic. Rural youth during an economic recession have less access to the jobs in urban cores and surrounding suburbs that they normally have. This resulted in youth being stuck in rural areas, waiting for the economy to improve and for opportunities to be created. Migration for all Americans slowed down during the Recession, due to the depressed home values kept many families stuck in place (Johnson, Kurtis, & Egan-Robertson 2017).

While domestic migration patterns are beginning to return to pre-recession patterns, the fertility rates of the country have not recovered. Fertility rates in the country have been dropping since the Recession began in 2008. Comparisons to the fertility rate of 2007 shows that there have been 6.6 million forgone births between the years of 2008-2019 (Johnson 2020). Data for foregone births is calculated by taking the difference between projected births and actual births. Projected births is measured by the 2007 age specific fertility rates multiplied by the total number of women of child bearing age in a given year (Johnson 2020). The fertility rates of young women declined significantly more than fertility rates of older women during the Great Recession, which could suggest that this is just a case of birth deferment instead of foregone births (Cherlin et al. 2013). However, the continued slow drop-in fertility rate now almost a decade after the Great Recession indicates that women are having less children than prior generations.

This thesis will attempt to analyze whether there are patterns amongst the counties in the United States that are experiencing differential decrease or increases in fertility. While it is noted that fertility is declining across the country, it remains to be seen whether there are parts of America that are facing less decline, or even fertility increases. Current literature highlights the drops in fertility across the country but does not examine the sub-regional trends in how this fertility rate is declining.

LITERATURE REVIEW

Demographic Transition

Natural increase is determined by the total number of births subtracted from the total number of deaths. Natural increase varies in societies based on their stage of development, which leads to several key demographic transitions. Warren Thompson created the demographic transition model in 1929, which has been refined over the years. The demographic transition attempts to explain population changes as countries become more developed and is the dominant model for explaining changing fertility rates in modern societies (Thompson 1929). Early societies are in Stage 1 of demographic transition, where birth and death rates are particularly high. This is seen in many preindustrial societies. Women tend to have a very large number of births, but many children do not survive to adulthood, and life expectancies are shorter during these time frames. Stage 2 of demographic transition is marked by birth rates continuing to be high while the death rate begins rapidly falling, this is common when cultures become modernized and make technological advancements. Stage 3 marks the beginning of birth rate decline in a culture. As members of a culture continue to live longer, the death rate continues to decline but does so significantly more slowly than in Stage 2. (Van dee Kaa 1987).

Stage 4 sees a stabilization of both low birth rates and low death rates. Natural increase in this stage is minimal, and in some instances represents the beginning of natural decrease within a country (Van dee Kaa 1987). Approaching Stage 4 of demographic transition can create concerns for governments. If experiencing natural decrease, a government would have to rely on an inflow of migrants in order to maintain or grow the country's population. The United States and other developed nations are currently in Stage 4 of demographic transition (Tamir 2019). Countries in Stage 4 demographic transition also feature an overall aging population, which can lead to policy questions of how to fund programs such as social security when those at retirement age of the country become a larger percentage of the overall population.

Changing Fertility Statistics

There are two key fertility measures that help outline the state of America's current fertility situation. The first measure is general fertility rate (GFR), the measure of births per thousand women aged 15-44 each year. In contrast, the total fertility rate (TFR) attempts to represent current age-specific fertility patterns. This measure is hypothetical and created using projections based on information about current fertility among women at each age. Both general fertility rate (59.0) and total fertility rate (1.73) hit all-time lows in 2018 (Livingston 2019). The fertility of older women declined the least during the Great Recession, while younger women saw larger declines in fertility (Cherlin, Morgan & Wilber 2013).

The ideal family size in American has shifted over time as well. When asked about what Americans view the "ideal" family to be, 48% say that they believe the ideal family size is two children, while barely any respondents believed the ideal family is to have one child or be childless (Newport & Wilke 2013). This represents a shift from the mid-1900's, when three children families were considered the ideal family size (Newport & Wilke 2013). This reported "ideal" household size is quite different than the actual American households. While two-children families are on the rise compared to the 1970s, rates of childlessness and one child families are also increasing (Livingston 2015). This indicates that the public perception of what an "ideal" family should be is not represented in actual family trends in American families. The rates of having four or more children have plummeted in recent decades, being replaced by two-children households (Livingston 2015). The increasing rates of childless or only having one child also indicate that the fertility rate is dropping. With fewer women opting for four or more children, the United States has a fertility rate that is below the level of replacement. Despite these changes in family size, over ninety percent of American adults say they want children (Newport & Wilke 2013).

Social Influences

A shift in culture over the past decade could also have led to this decline in fertility among the millennial generation. Humans are social actors and are continually influenced by their peers. An analysis of intended pregnancies shows that individuals are more likely to decide to have a child shortly after a close friend has a child (Balbo & Barban 2014). Seeing peers go through the pregnancy process could help couples decide that they are ready to have children. As the fertility rate decreases, fewer couples will experience peer group influence that could lead them to decide it is the right time to have children.

In the continued discussion of whether births are being delayed or foregone, changing rates of marriage and cohabitation are a relevant social change that could be impacting fertility rates. Marriage rates have declined over the past several decades, and the Great Recession brought significant declines in marriage (Cherlin et al. 2013). High rates of divorce and rising cohabitation rates have led some to question whether the institution of marriage is as valued by current American young adults. Prior generations did not view cohabitation favorably, but cohabitation rates and acceptance of cohabitation have risen in recent decades, especially during times of economic hardship (Cherlin et al. 2013).

Cohabitation continues to be a popular living arrangement for a younger generation as they navigate the difficulty of reaching adulthood in a post-Great Recession economy that never seemed to recover for the average American. Many couples are delaying marriage and instead opting into cohabitating. The main driver behind this decision is that couples feel ready to get married, do not feel they have the economic stability that they view as a necessity for getting married (Smock, Manning & Porter 2005). A lack of economically attractive marriageable men is also a driver of lower marriage rates (Lichter et al. 1992). Nonmarital fertility is rising, and is mainly occurring between cohabitating couples (Lichter, Sassler & Turner 2015). While cohabitation is rising, most births still occur among married couples. The increase in cohabitation could lead to shifting social norms that make it more socially acceptable for children to be born out of wedlock. It remains to be seen if the rise of cohabitation is causing women to delay having children, in which case the fertility rates of the country could rebound in the coming years. However, with drops in fertility continuing over the past decade, this seems increasingly doubtful.

Cultural expectations of motherhood can also weigh on women who are deciding whether to have children or not. American mothers are expected to put significant effort into both their home life and their work life, causing mothers to feel unable to commit the appropriate amount of time to either (Collins 2019). Women acting as a breadwinner for the family became more common during the Great Recession, as rising unemployment during the recession mainly affected male dominated fields (Smith 2010). The stress that mothers experience is noted by women who have yet to have children, as reflected in their view of motherhood as an intensive and overwhelming process (Maher & Saugeres 2007). When this is coupled with diminishing fertility among friend groups, the combination could discourage childless women from having children.

The United States is one of the few developed nations without strong family care policies. The lack of family care policies such as paid family leave and universal pre-K childcare has tangible effects; parents in America are unhappier in comparison to their childless peers (Glass, Simon & Andersson 2016). While this phenomenon is true in all advanced industrialized societies, it is particularly significant in the United States which has the largest happiness gap between parents and non-parents. The happiness gap is created by significant stress that comes with being a parent. However, research suggests that advanced industrialized societies with the stronger federal laws regarding family policy have smaller happiness gaps. This is achieved by the happiness of parents tending to increase, while the happiness of nonparents is not affected (Glass, Simon & Andersson 2016). These findings suggest that the United States could improve the welfare of parents by instituting family support policies that are standard in much of the developed world.

Economic Influences

Both economic and social conditions have changed in the United States over the past seventy years with the rise in women's participation in the workforce. In 1950 women represented only 29.6% of the workforce, while today women comprise 46.9% of the workforce (Fry & Stepler 2017). This change had significant ramifications for fertility in America. The heightened career aspirations of women are one of the common causes of drops in fertility that come with Stage 3 of the demographic transition (Van de Kaa 1987). Balancing career and family obligations is difficult for most women, as both these institutions are viewed as "greedy institutions" (Coser 1974). These "greedy institutions" are both significantly demanding of a mother's time because they require significant commitment. This leaves many potential mothers in a quagmire; do they choose to focus on raising a family or on growing their career?

As women's participation in the workforce increased, American's ideal family size began shifting toward two children instead of four or more (Gao 2015). This shift in economic condition towards two income households left many adults unable to find the time to care for children. Additionally, stagnant wage growth also contributed towards this shift towards wanting fewer children. Real wages have stagnated for the average worker, leaving them with significantly less purchasing power than they would have had in the 1950's (Desilber 2018). The stagnation of wages combined with the increasing cost of raising a child has made it increasingly difficult for families to be able to afford to have children. While desire for children remains strong in the United States (Newport & Wilke 2013), it can leave many parents in a bind; they want to have children but do not have the means to afford to raise them. This could lead families to have fewer children than they would like, or not have children at all. Improved economic conditions for all could lead to a bounce in the fertility rate, as families would have more economic flexibility to have children without having to question whether having a child is the right economic decision.

There are distinct differences between women in the workforce who decide to have children and those who do not. Women in jobs that have significant autonomy, complexity and prestige are more likely to delay having children, if they decide to have children at all (Shreffler 2016). Meanwhile, women who work in jobs with less prestige are more likely to not wait to have children (Shreffler 2016). Women with higher status jobs could feel increased pressure to advance in their career, and thus to to wait for the right time to have children. They may also delay having children in order to build up economic resources and social capital to have an easier transition into parenthood when the time comes. Women in lower status jobs may feel unrewarded in their field, making it easier to focus on becoming a mother than career advancement. Additionally, they would have a much more difficult time building resources to ease the transition towards parenthood, which could explain why they do not delay having children due to career influences.

A perilous economic situation further complicates a family's decision to have children. Although the Great Recession was declared over in 2010 by economists, many parents continue to grapple with difficult financial decisions. It is widely believed that the main reasons that families are not having more children is due to not concerns about the cost of children and the current labor market (Newport & Wilke 2013). Historically, when unemployment rises, the fertility rate tends to fall (Currie & Schwandt 2014). This held true with recent economic downturns in the United States; states that suffered large increases in unemployment during the Great Recession also had the highest reductions in fertility rates (Cherlin et al. 2013). The normal occurrence during times of increased unemployment is that births are just postponed, women wait until they are in a financially stable situation to have children. However, since the Great Recession, fertility rates have not recovered. Because fertility rates have not improved since the Great Recession, there have 6.6 million foregone births since 2007 (Johnson 2020).

The uneasy financial climate that arose from the Great Recession has made families tepid about having a child, given the associated financial responsibility. The average cost of raising a child is $233,610, not including assisting a child with college education (Lino 2017). With such high costs associated with parenthood, it makes sense that families would wait before having children until their situation is more economically viable. Countries that suffer from long term unemployment typically have a culture where childbearing occurs later in life, since the economic means needed for child rearing have not yet been obtained (Adsera 2005). As young Americans are struggling to obtain the economic means to get married (Smock, Manning & Porter 2005), the economic commitment necessary to have a child is even further out of reach.

The falling fertility rates in America is the result of a multitude of factors that could be dissuading young people from having children. The economic situation of many young people is causing them delay having children, as raising children is more of an economic burden than in generations prior. Meanwhile, social norms seem to be shifting towards families having fewer children, while the federal government does not institute any policies to make the transition easier for prospective parents.

The net result of this could be a generational shift toward delayed births. More women could be choosing to have children in their late thirties and early forties, but there is not currently enough data from the Great Recession to see if a rebounding of fertility rate will occur. Overall, this seems less likely given that is has been a decade since the Great Recession and fertility rates continue to decline. While fertility declines have been common during economic recessions, the Great Recession represents the first-time fertility rates have not rebounded as economic conditions improve. This is due to the variety of social and policy factors outlined above, as well as to growing economic inequality throughout the nation.

To understand why fertility rates have declined, it is important to learn which types of women are having fewer children. For example, are rural or urban mothers more likely to have fewer children or opt out of parenthood entirely? What effect does education have on number of children women tend to have? Looking at these metrics could help to create effective polices that create conditions for women in these demographic sub-groups that provides them with the opportunity to have children again. Existing data shows that women who struggle financially navigate a tougher road to motherhood than those that are well off. If income inequality continues to grow, this will continue to affect more women of childbearing age who want to be mothers.

This study addresses the difficult challenge of untangling the decline in fertility. A multitude of factors could be contributing to the fertility decline. In order to contribute to the literature, this study examines a multitude of county level variables in order to further understand recent fertility decline.

RESEARCH METHODS

Data Sources

To analyze current fertility trends across sub-regions of the country, I compiled secondary quantitative data from various government agencies. Final birth data from the National Center for Health Statistics is used to analyzed trends in United States modern fertility rates (Brady et al. 2015, Martin et al. 2019). The live birth data includes every birth certificate registered across the country. This final birth data highlights recent nationwide fertility trends before discussing trends with the county level data from the American Community Survey.

The bulk of data is from 5-year American Community Survey (ACS) data from the U.S. Census Bureau. The 2010 and 2018 ACS datasets were selected to be the comparison points for the study. The 2010 5-year ACS encompasses the entirety of the Great Recession (2008-2010) and includes the immediate years preceding it (2006,2007). It is the oldest five-year dataset available. The 2018 5-year dataset is the most recent dataset available at the time and ranges from 2014-2018. The 2018 dataset will highlight any fertility recovery or decline since the end of the Great Recession. With economists declaring the recession over mid-2009, the economy had several years to recover, allowing families to resume having children at rates similar to the pre-recession if they so desired. (National Bureau of Economic Research 2010).

Fertility rates were calculated using data from the ACS. The general fertility rate is calculated for each county using the following formula:

$$\frac{Number\ of\ births\ from\ women\ age\ 15-44}{Population\ of\ women\ age\ 15-44}\ X\ 1000$$

Some researchers use 15-49 to calculate a general fertility rate. However, when ACS provides age-based birth data it includes 45-50 instead of a group for 45-49. As a result, the maximum age used in this study is 44, which is congruent with other fertility studies.

Variables

The states were sorted into 4 regions: Northeast, Midwest, South and West. These categories were determined by the Census Bureau official region designations. The metropolitan variables were created using a condensed version of the 2013 USDA Rural-Urban Continuum Codes (USDA 2013). The original 9 codes established by the USDA have been condensed into 4 categories used for this study: Big Metro, Small Metro, Nonmetro Adjacent, and Nonmetro Nonadjacent. Big Metro (N=472) counties are part of a metropolitan area that includes a population of one million or more. Small metro (N=763) counties are part of a metropolitan area that has a population of less than one million. Nonmetro Adjacent (N=1034) counties are not part of a metropolitan area but are adjacent to a metropolitan area. Nonmetro Nonadjacent (N=950) counties are not a part of or adjacent to any metropolitan area.

Race is represented by the 2010 racial compositions of the county, with attempts to ensure minimal overlapping between groups. White counties were designated as counties that had a non-Hispanic White population of at least 75% (N=2101). Black counties are those with a non-Hispanic Black population of as more than 25% of the total population (N=405). Hispanic counties were similarly labeled as such is the county is more than 25% Hispanic (N=321). It is important to note that there is potential in the data set to have a county count for both the Black and Hispanic counties, since the variables were non-exclusive. However, there is only one instance on this among the 3219 counties that are included in the data. Finally, a diverse category includes any counties that did not fit the criteria of the three other race categories (N=393).

To measure socioeconomic status, median household income and percent of residents with a bachelor's degree or higher were obtained through the 2010 ACS. For median household income, the poorest bracket were counties that had a median income of $34,999 or lower (N=636). The next two categories are $35,000-$44,999 (N=1384) and $45,000-$54,999 (N=760). The highest measure of median household income in a county were counties that had a median household income of $55,000+ (N=439). Since these variables are taken in 2010, median household incomes seem low since the five-year measure includes the Great Recession.

The percent college graduate variable includes any resident of a county aged 25 or older that has obtained at least a bachelor's degree. The lowest group for this variable are counties who have less than 15% of the population with a degree (N=797). The remaining groups are: 15-20% (N=936), 20-30% (N=653), and 30%+ (N=833). Like the median household income variable, these numbers may seem lower than expected since they are based on the 2010 ACS. The 2018 ACS indicates that the percentage of adults over the age of 25 has increased.

Six different economic dependence typologies from the USDA were used in the analysis in addition to one USDA policy-relevant code for retirement destination. The most recent county typology codes were released in 2015 and use employment and economic data from 2010-2012 to classify these counties (USDA 2019). Counties were labeled farming-dependent if 25%+ of the counties earning were generated from farming or if farming represented 16% or more of the county employment. Mining counties were counties that had 13%+ of earnings or 8%+ of employment generated from the field. Manufacturing is responsible for at least 23% of county earnings or at least 16% of employment in manufacturing-dependent counties. Government counties have a high presence of federal or state of employment, accounting for 14% or more of county earnings and 9% or more of unemployment (USDA 2019).

Recreation counties are classified in a different manner than other economic classifications. For recreation counties, an analysis is run using the percentage of employment in the county in entertainment and recreation positions, restaurants/bar industry and real estate. Additionally, the percent of total income in the county from recreation industries from the Bureau of Economic Analysis is weighted, and finally the percentage of housing units in the county intended for vacant or seasonal housing. The three variables are combined into a weighted index of z-scores and those with a scores and those with a score of .67 or higher are classified as recreation counties. Nonspecialized counties are those that did not qualify for any of the five prior categories. Finally, retirement destination counties are those that experienced a 15% or higher growth in residents over the age of 60 from 2000 to 2010 (USDA 2019). The USDA methodology can create scenarios where there is overlap between recreation and retirement counties. Counties that did not meet any of the typologies are classified as non-specialized. These counties have diverse and balanced economies. Many metropolitan counties are classified as non-specialized.

The descriptive data portion of the study highlights the change in fertility rates and lost births that are created drops in fertility. Lost births are calculated by taking the 2010 ACS fertility rate and multiplying it by the population of childbearing age in a county according to the 2018 ACS. By subtracting the actual births from the projected births, it gives us the total of lost births that a county experienced due to declines in the fertility rate.

The analytic portion of the results covers linear regression models for 2010 Fertility, 2018 Fertility and Change in Fertility. Within these regressions are models that incorporate the region, urban/rural, race, USDA economic typologies and the SES variables to attempt to explain both where the fertility rates are higher and which counties are experiencing greater declines in fertility over the observed eight-year period.

RESULTS

Descriptive Data Analysis

Figure 1. Actual number of births in America since 2000 compared to projected births based on 2000 fertility rates

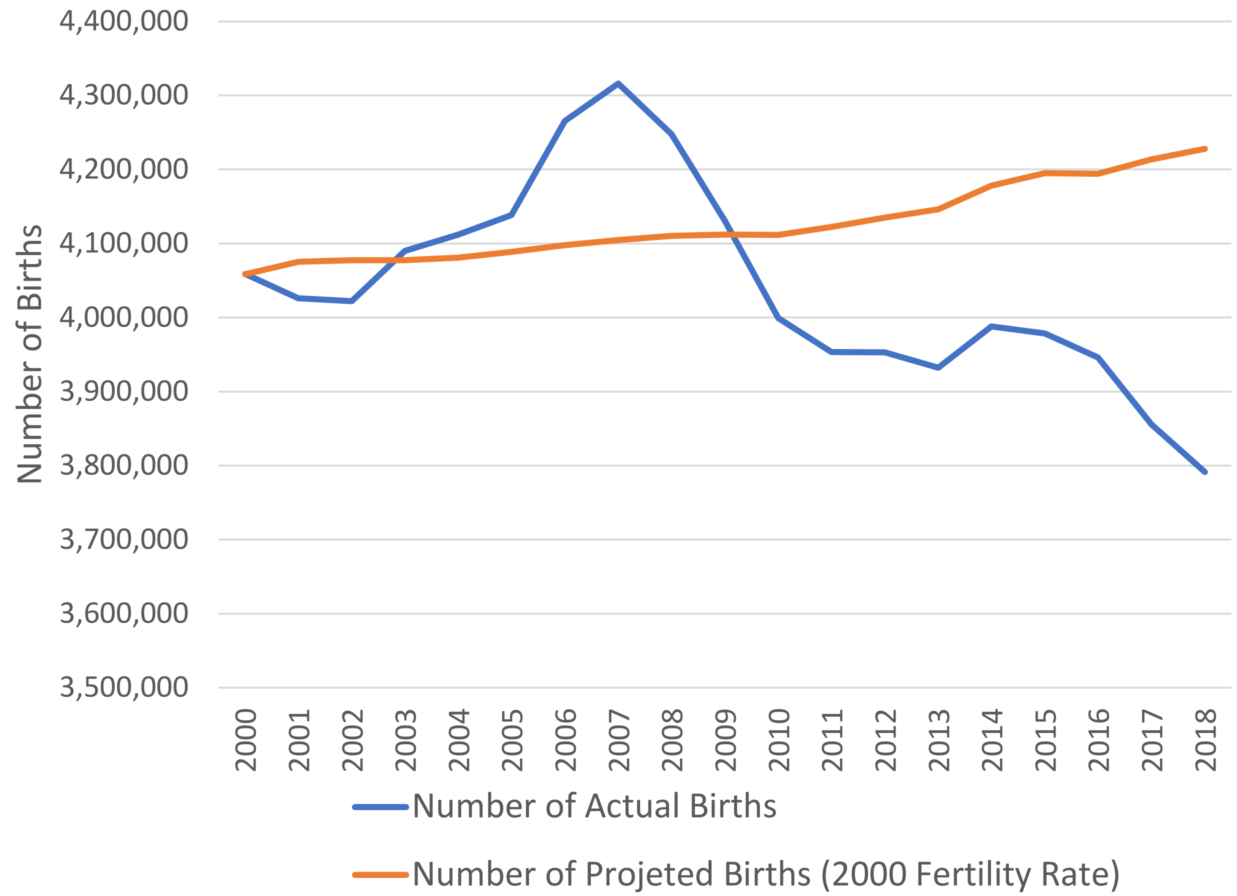


Figure 1 uses live birth data from the NCHS to showcase how the number of births and fertility rates have changed since 2000. Projected number of births is calculated by multiplying the number of women childbearing age each year by the 2000 fertility rate. Numbers of births peaked in 2007 at 4.3 million births. Number of births quickly declined during the Great Recession, dropping to 4 million in 2010, when the recession ended. So far, there has been no post-recession recovery, as births continued to fall to 3.8 million in 2018.

Number of total births were steadily rising before the Great Recession. The fertility rate in the country peaked in 2007, at 69.3 births per thousand. Fertility increased during the year preceding the recession, when the United States had general economic prosperity. The onset of the Great Recession quickly erased the gains in fertility and total number of births. In 2018, the 3.8 million births represent a rapid decline in the total number of births. The decrease in births cannot be attributed to a reduction of women of childbearing age. Women ages 15-44 were increasing during this time period, which should have resulted in an increase in births if fertility rates had stayed constant. The result of this decline in fertility is millions of lost births when compared to fertility rates right before the recession (Johnson 2019).

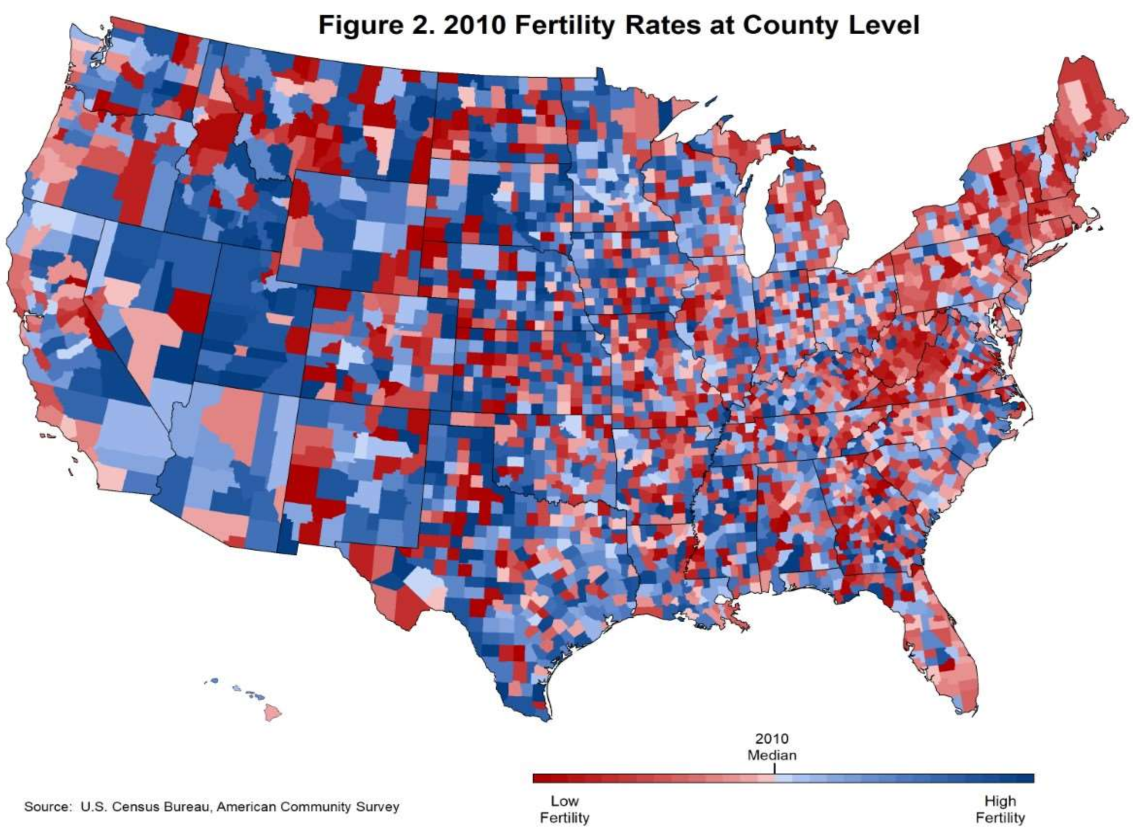
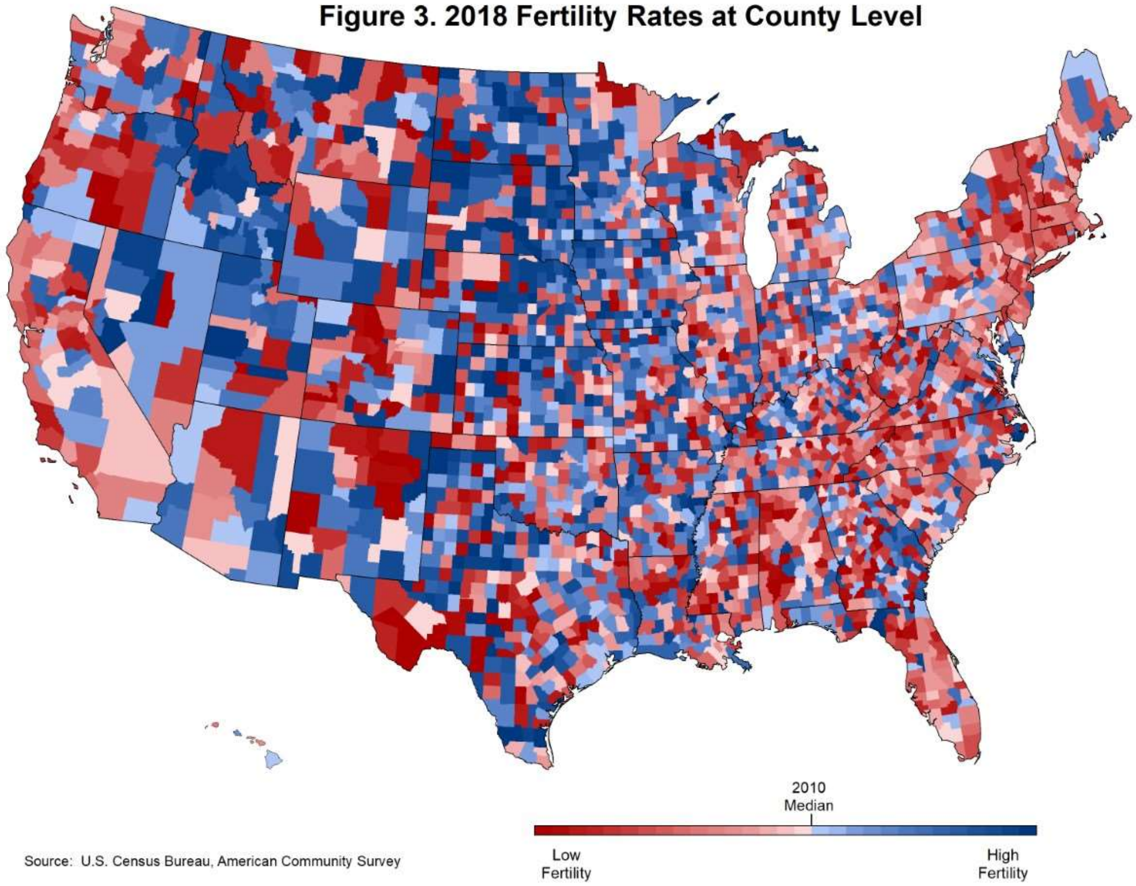


Figure 2. 2010 Fertility Rates at County Level

Figure 3. 2018 Fertility Rates at County Level



Source: U.S. Census Bureau, American Community Survey

Figures 2 and 3 illustrate county fertility rates obtained from the 2010 and 2018 5-year American Community Survey. From these maps, we can observe general trends that are present in the data. The center point of the legend (light red) represents the median fertility rates from the 2010 ACS. In Figure 2, it can be observed that the higher fertility rates stretch across the Midwest in more rural areas. In addition to that, Utah, a state with a high Mormon population, also has relatively high fertility compared to the rest of the country. Meanwhile, the Northeast has below average fertility. Big metropolitan areas, such as New York metropolitan area, and the

San Francisco-San Jose-Oakland metropolitan areas also have below average fertility. Southern California, which has a high Hispanic population, has largely above average fertility.

Figure 3 provides a visual representation of declined fertility in 2018, compared to the 2010 median fertility rate. Utah, which had high statewide fertility in 2010, now has counties with below average fertility rate. The Midwest continues to have predominantly above average fertility and the Northeast still has low fertility. Some areas in the Northeast now show above average fertility, particularly northern Maine and New Hampshire. The South had many counties that had above average fertility rates in 2010 now below that median in 2018. The metropolitan areas have even lower fertility rates, particularly Long Island is now a dark red and there is below average fertility all around the San Francisco metropolitan area. Southern California has now flipped from largely above average fertility to predominantly below average.

Figure 4. Change in Fertility Rate at County Level 2010 to 2018

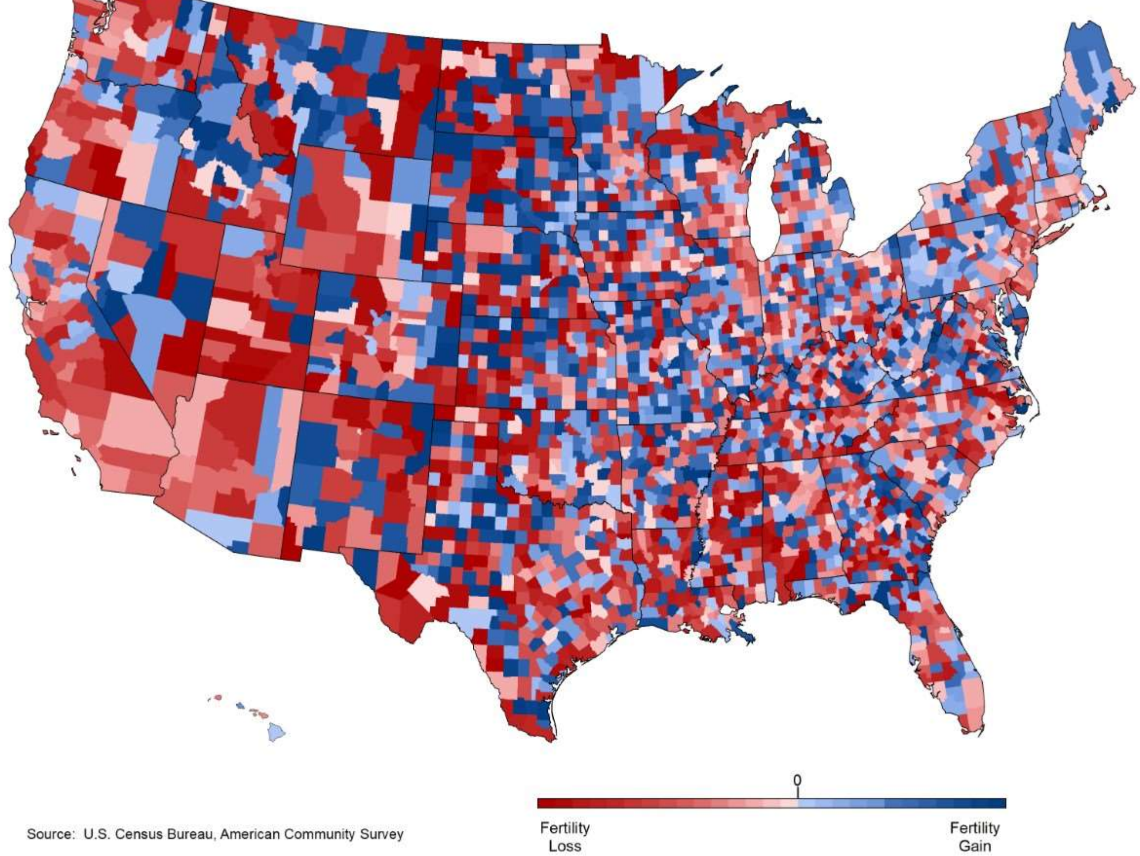
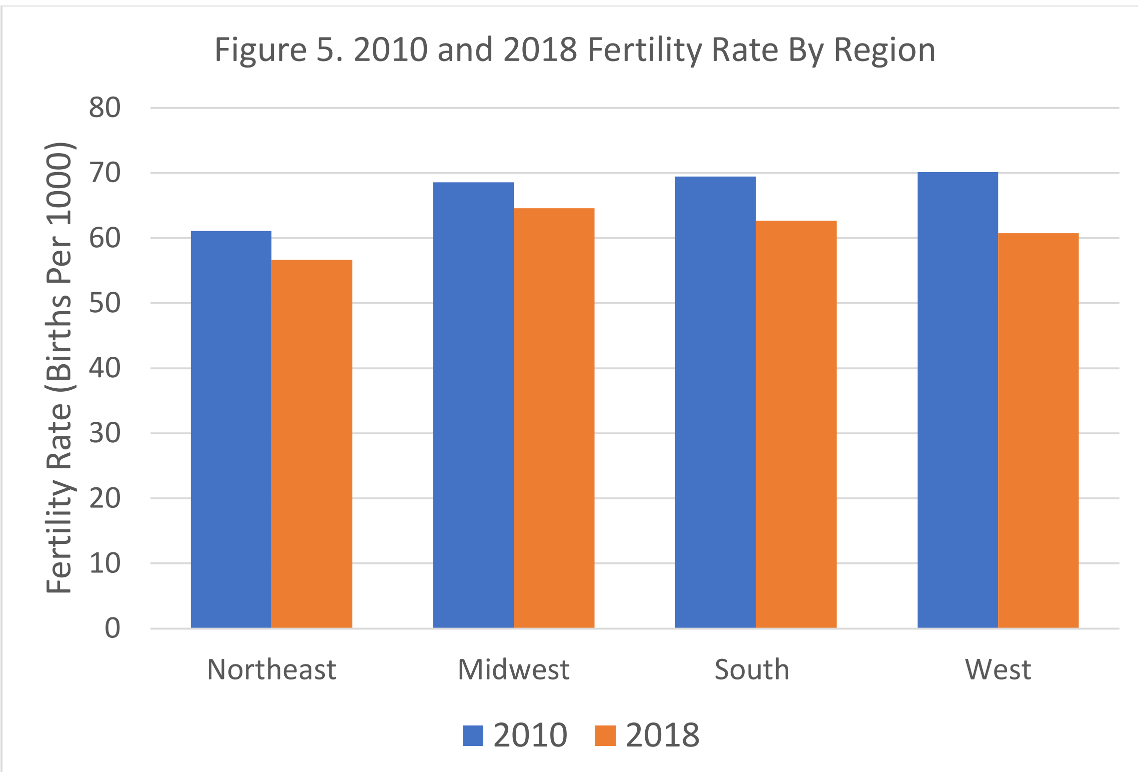


Figure 4 visualizes fertility change from 2010 to 2018. The largest concentration of fertility gain comes from the largely rural Mid-West portion of the country. Additionally, many counties throughout the Midwest had the most concentrated gains in fertility. The Northeast also has a sizeable amount of their counties experiencing fertility gain, although that is mainly in the more rural areas and overall fertility is low in the region (Figure 3). Counties that feature metropolitan areas also experienced fertility decline between the two observed periods. Long Island, in addition to Los Angeles, San Francisco and Seattle metropolitan areas experienced notable declines in fertility. All southern California experienced declines in fertility, as did many counties along the U.S.-Mexico border. States with a high percentage of Black residents, such as Louisiana and Mississippi also experienced large drops in fertility.

1,797 counties experienced fertility decline between 2010 and 2018, while 1,394 counties experienced no change or an increase in fertility. The general fertility rate for the entire country from the 2010 ACS is 67.8, and the 2018 fertility rate is 61.3. This marks a 9.5% decline in fertility in under a decade. Births fell 7.8% during this time period, while the population of women childbearing age increased by 1.9% The decline in number of births despite an increase in women of childbearing age contributes to the rapid decline in fertility rates across the country.



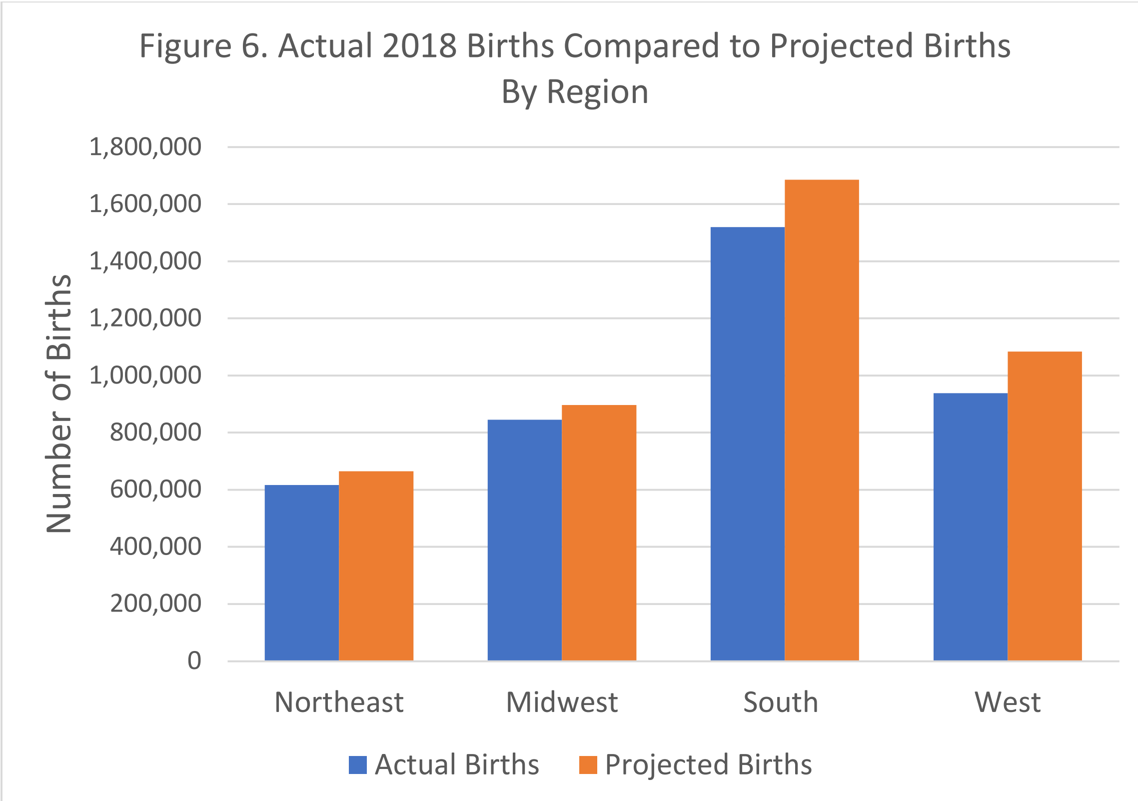
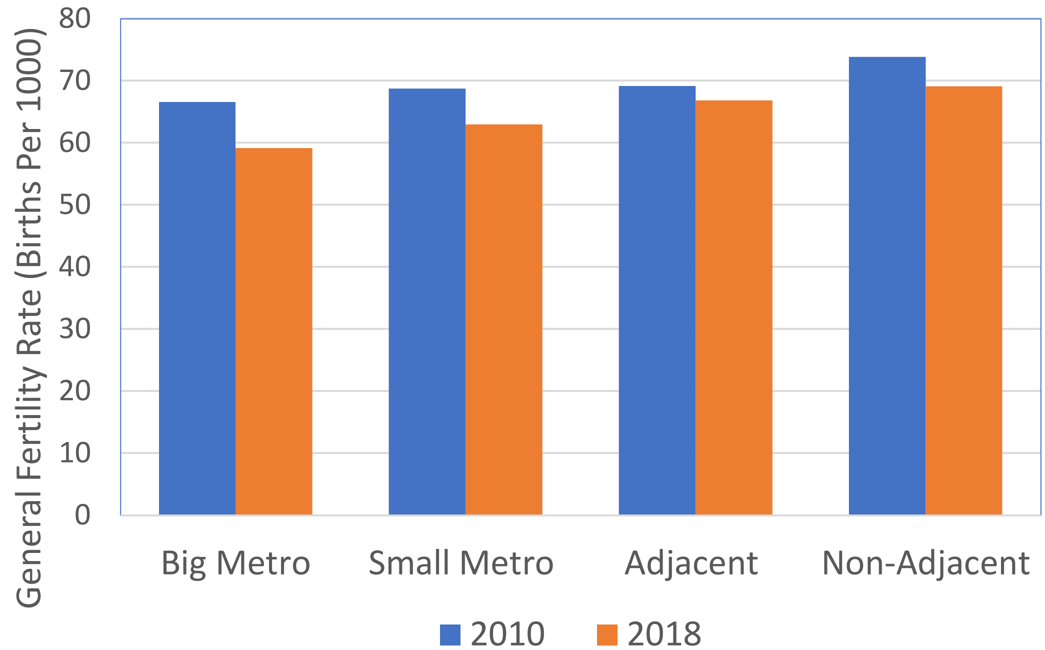


Figure 5 shows the changes in fertility rate for the four different regions of the country, as designated by the Census Bureau. All four regions experienced declines in fertility. The West experienced the largest decline in fertility rate, falling 13.4%. This decline in fertility is caused by the West experiencing a 9.1% drop in births, while also seeing the population of women childbearing age increase 5.0%. As noted in the maps, many rural counties in the Midwest did not appear to experience declines. The Midwest experienced the smallest decline in fertility rate, at 5.8%. Births in the Midwest dropped 7.6% between the two time periods while the population of women child-bearing age also declined by 1.8%. In 2010, the South had the highest fertility rate out of the regions (69.5), while in 2018 the Midwest ended up with the highest fertility rate (64.6). The Northeast experienced a smaller decline in fertility (7.3%), however the Northeast region already had the lowest fertility rate among the regions.

Figure 6 represents the actual number of births in 2018 compared to the projected births using 2010 fertility rates. The gap between these variables represents lost births that did not occur due to declining fertility rates. The South and West account for the most lost births at 159,327 and 129,781 respectively. Since the Northeast and Midwest overall had a lower amount of births, their declines in fertility contributed less to the aggregate lost births. For the country as a whole, the 2018 ACS averaged 3.94 million births per year. However, using projections based on the averaged 2010 fertility rates, there should have been 4.36 million births per year.

Figure 7. Fertility Rates in 2010 and 2018 By Metropolitan Status



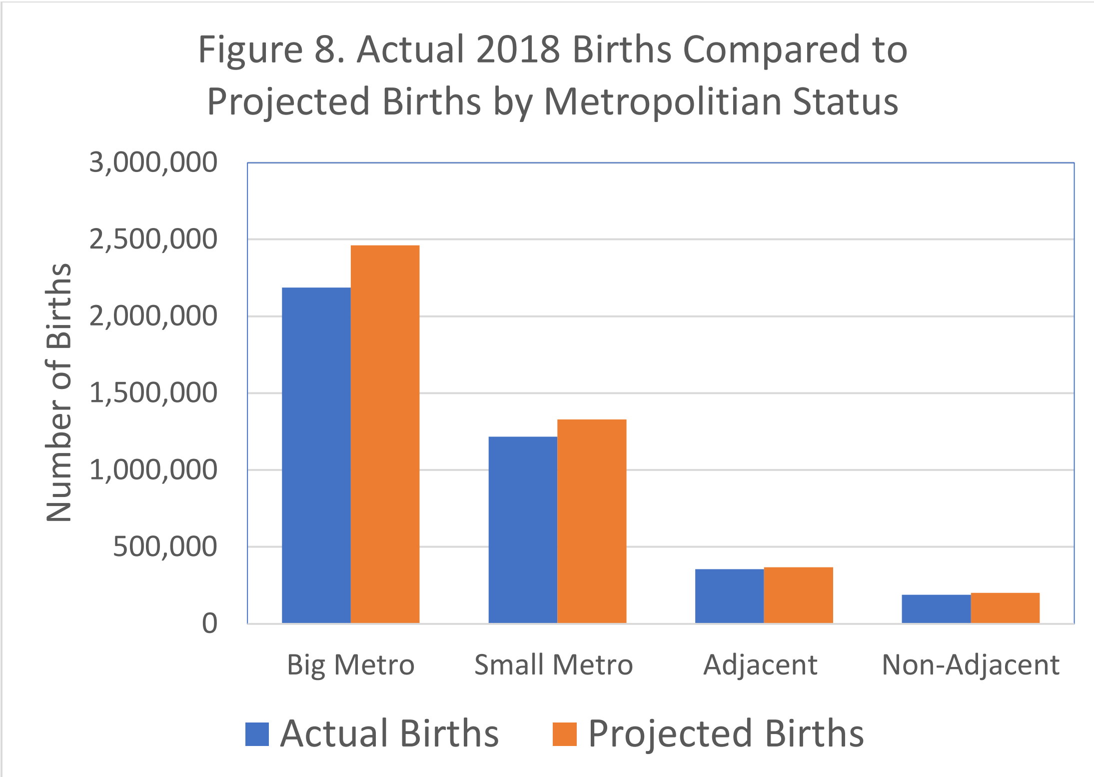
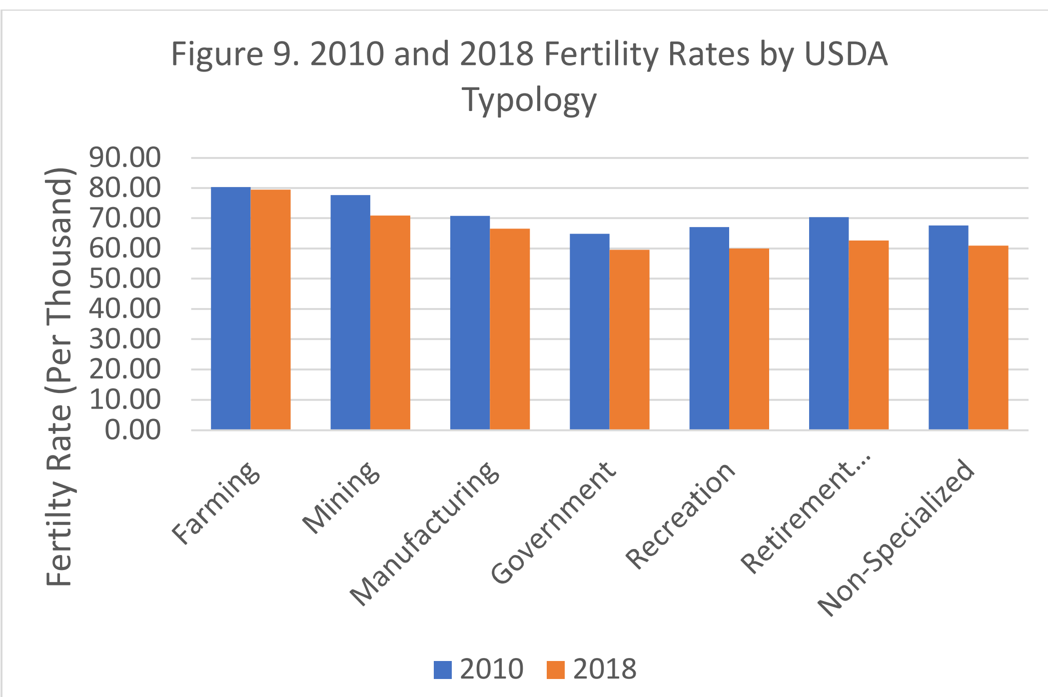


Figure 7 shows how counties of all metropolitan status are experiencing declines in fertility. The big metropolitan areas are the ones that are experiencing the most notable declines in fertility, declining 11.14%, from a fertility rate of 66.5 to 59.1 Rural adjacent counties saw the smallest drop-in fertility rates at 3.35%, dropping from 73.8 births per thousand to 69.1. Both rural adjacent and non-adjacent counties experienced higher declines (8.12% and 9.85%) in number of births than did the big and small metropolitan areas (8.06% and 6.76%). The rural counties experienced lower declines in fertility rate because they also saw a reduction in women of childbearing age. The metropolitan areas are experiencing larger declines in fertility due to seeing a reduction in total number of births while also having their population of childbearing age women increase. Overall, all four metropolitan types experienced declines in fertility, but the rural counties maintained higher fertility rates in both 2010 and 2018 than the urban counties.

Figure 8 demonstrates how shifts in the fertility rates changed the number of actual births across the different metropolitan areas. Big metropolitan areas account for over 250,000 lost births per year, which is more than the other metropolitan types combined. Both rural adjacent and rural non-adjacent counties each accounted for less than 15,000 lost births per year. The big metropolitan areas have the most women childbearing age 36.9 million, while the other metropolitan areas have a combined 27.3 million. Having larger populations of women childbearing age leads to a greater number of lost births when fertility rates decline. The big urban core counties will be the first to experience ramifications from declining fertility rates. Since the other metropolitan types have much smaller populations, the changes to these areas as a result of declining fertility might take longer to manifest. The metropolitan areas are gaining migrants, which could offset the effects of declining fertility.



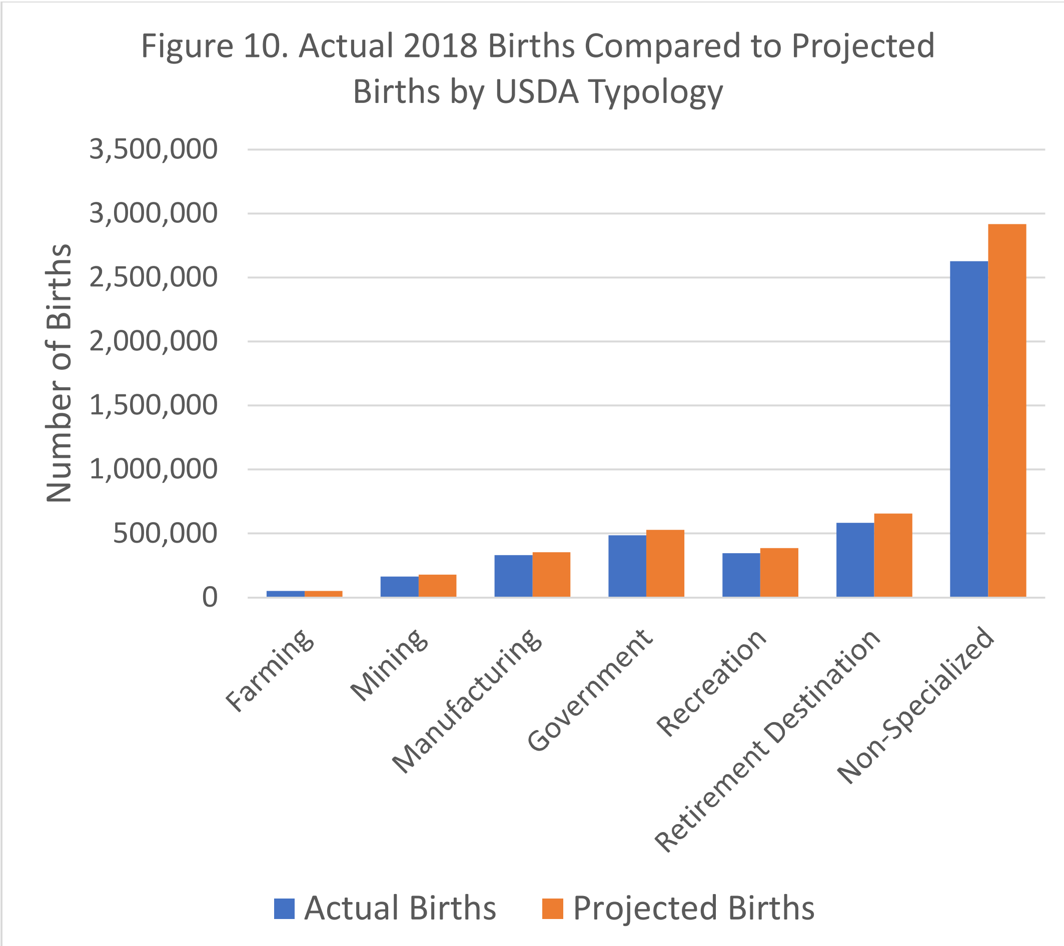
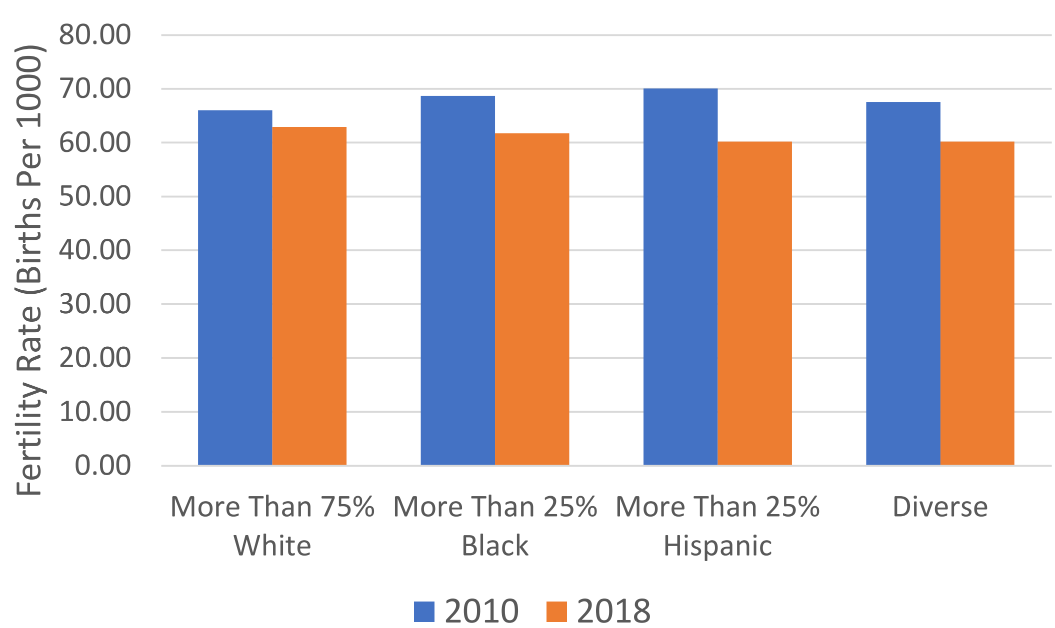


Figure 9 highlights how fertility rates have changed across USDA economic and policy-relevant variables. Out of all the types analyzed, farming counties experienced the lowest decline in fertility, experiencing only a 1% decline from 2010 to 2018. Farming counties also have the highest fertility rates of the USDA typology. Many of these farming counties are in the Midwest, which is still experiencing high fertility rates in 2018 (Figure 5). Recreation and retirement counties experience the largest drops in fertility rates at 10.5% and 10.9% respectively. The diminished fertility rate in retirement destination counties is more a function of a large influx of women aged 15-44, as that increased by 8.4% from 2010 to 2018. The drop of fertility in recreation counties came largely from drops in number of births, which declined 8.2%. All USDA typology variables experienced declines in total number of births.

While farming counties have high fertility ratings, the 472 farming counties only had a combined 50,679 births in 2018. When analyzing lost births, farming counties only had a deficit of 483. Like the rural adjacent and non-adjacent counties in Figure 7, farming counties have had their population of childbearing age women decline by 3.7%. The faming counties have a total population of women childbearing age of 663,210 in 2010. The next smallest cohort of women childbearing age is in the mining counties, where the 256 counties have a population of 2.2 million women childbearing age. The farming counties represent some of the most rural parts of the country, with many small communities. The overwhelming majority of lost births from the USDA typology variables comes from the nonspecialized counties. These non-specialized counties had 289,692 lost births per year across the observed time period. 1,235 counties were designated non-specialized, which is more than double any of the specialize counties. Additionally, many big metropolitan counties are labeled nonspecialized due to the mixed economies in the urban cores.

Figure 11. Fertility Rates in 2010 and 2018 By County Racial Composition



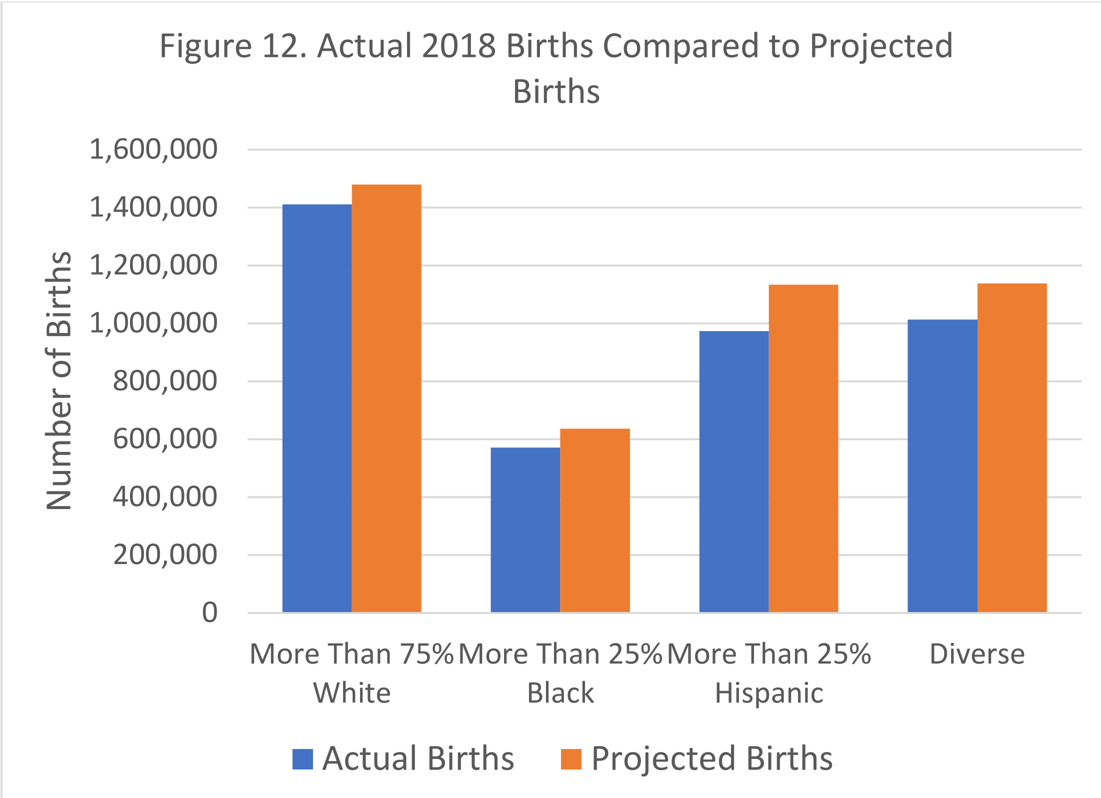


Figure 11 highlights how fertility rates have changed based on the racial composition of the county. Counties with a high Hispanic population had the biggest decline in fertility, with fertility rates dropping 14.1%. Hispanic counties had the highest fertility rates among the race variables observed in 2010 at 70.0 births per thousand women of child-bearing age, and by 2018 had the lowest at 60.2 births per thousand. Black counties experienced a 10.1% decline in fertility rates. Meanwhile, counties that were over 75% White only had a 4.7% decline in fertility. This is in part due to white counties having a lower fertility rate (66.0) than Hispanic (70.0) or Black (68.7) counties in 2010. This decline corresponds with regional trends in fertility declines seen in Figure 5. The Northeast, which has more counties over 75% white, did not have major declines in fertility. Meanwhile, counties in the South and West, which has large Black and Hispanic populations, experienced greater declines in fertility. In terms of number of births, all racial categories experienced declines.

The White counties saw a slight decline in the number of women of childbearing age at .5%. The Black counties also saw minimal change in their population of women of childbearing age, with an increase of .3%. The Hispanic counties saw the largest increase in women of childbearing age at 4.4%. This makes the declines in fertility rate most notable for the Hispanic counties, as they experienced both greater declines in number of births and the largest increase of population of women ages 15-44.

Counties with large Hispanic populations accounted for 159,327 lost births among the race variables, and diverse counties accounted for 124,426 lost births. Hispanic counties saw large fertility rate declines as a result of declining total number of births and increase in population of women childbearing age. White counties, despite having significantly more total births, only had 68,722 lost births in 2018 due to the smaller decline in fertility rates. White counties had lower decline in fertility rate in part because they experienced a decline in population of women childbearing age. The decline in total number of births were similar to Black and Hispanic counties. Counties with large Black populations counties accounted for a similar amount of lost births (64,448) compared to White counties, despite these counties having significantly less births overall than White counties.

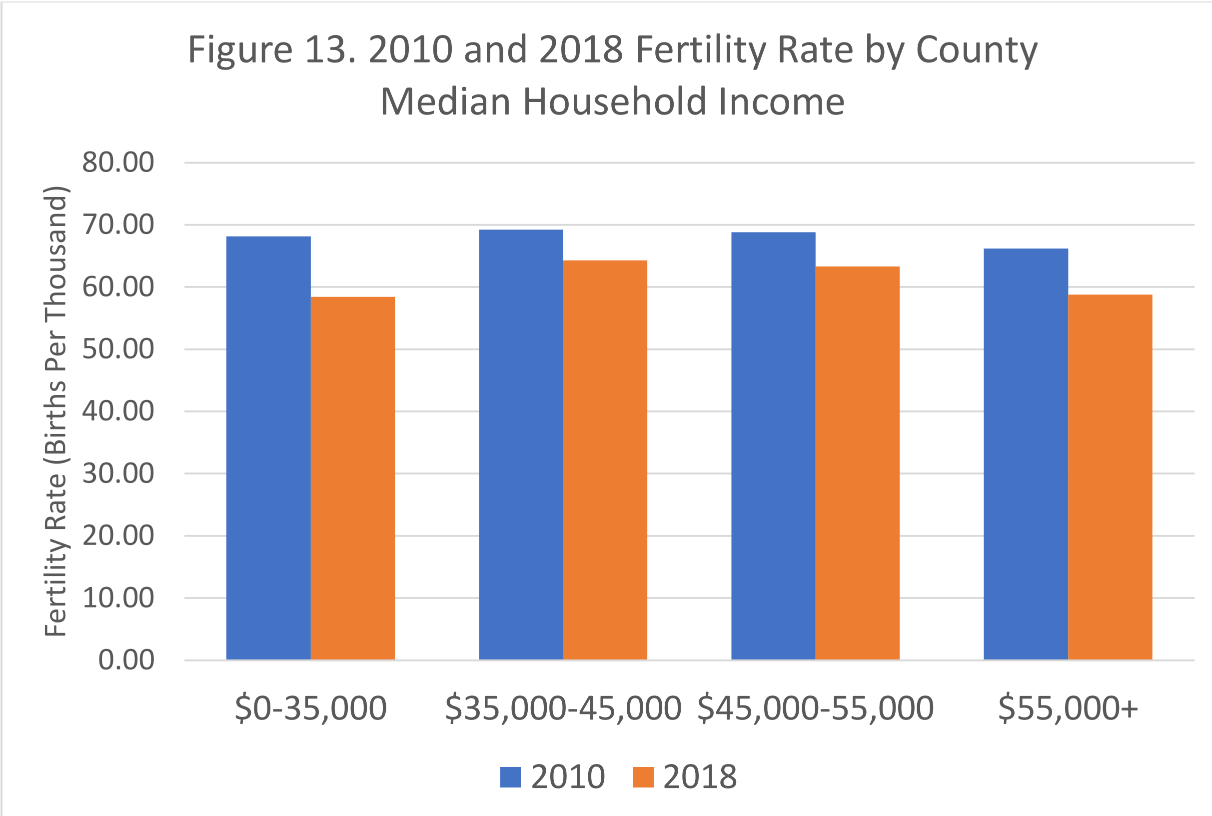


Figure 13. 2010 and 2018 Fertility Rate by County Median Household Income
Fertility Rate (Births Per Thousand)
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
$0-35,000
$35,000-45,000
$45,000-55,000
$55,000+
2010
2018

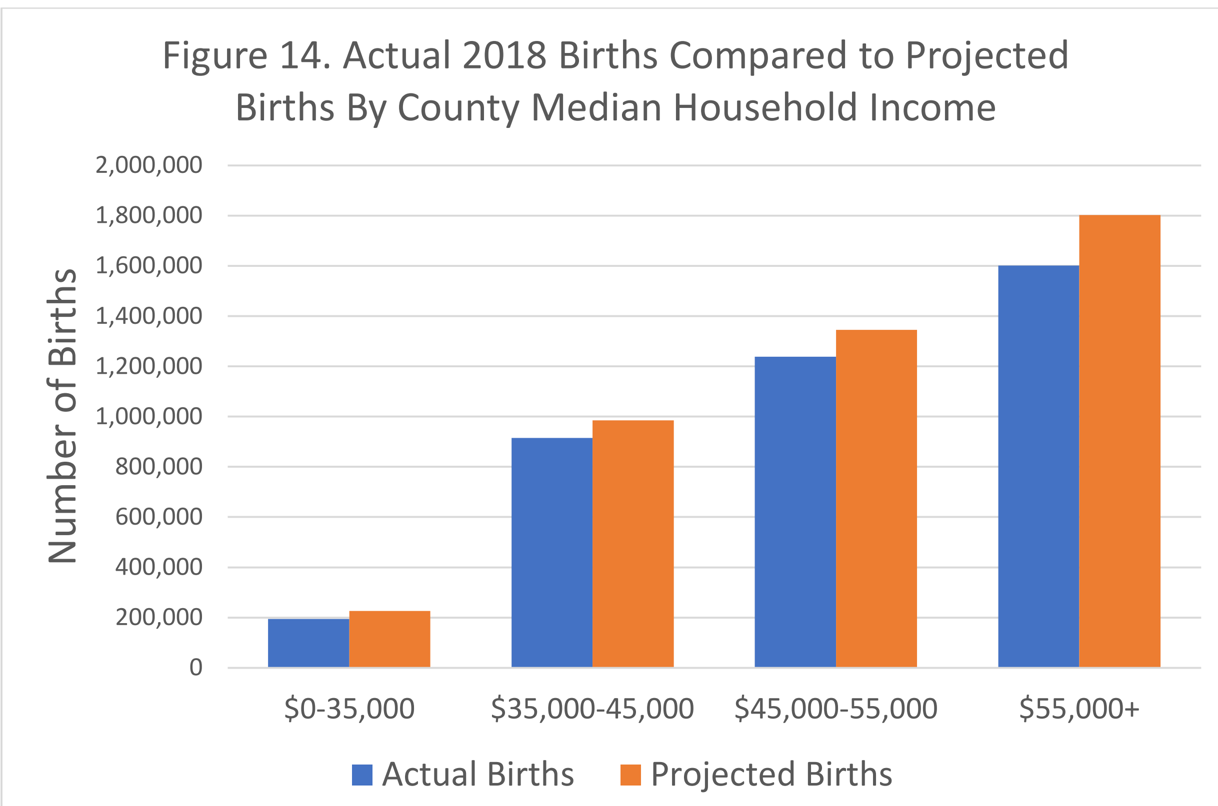
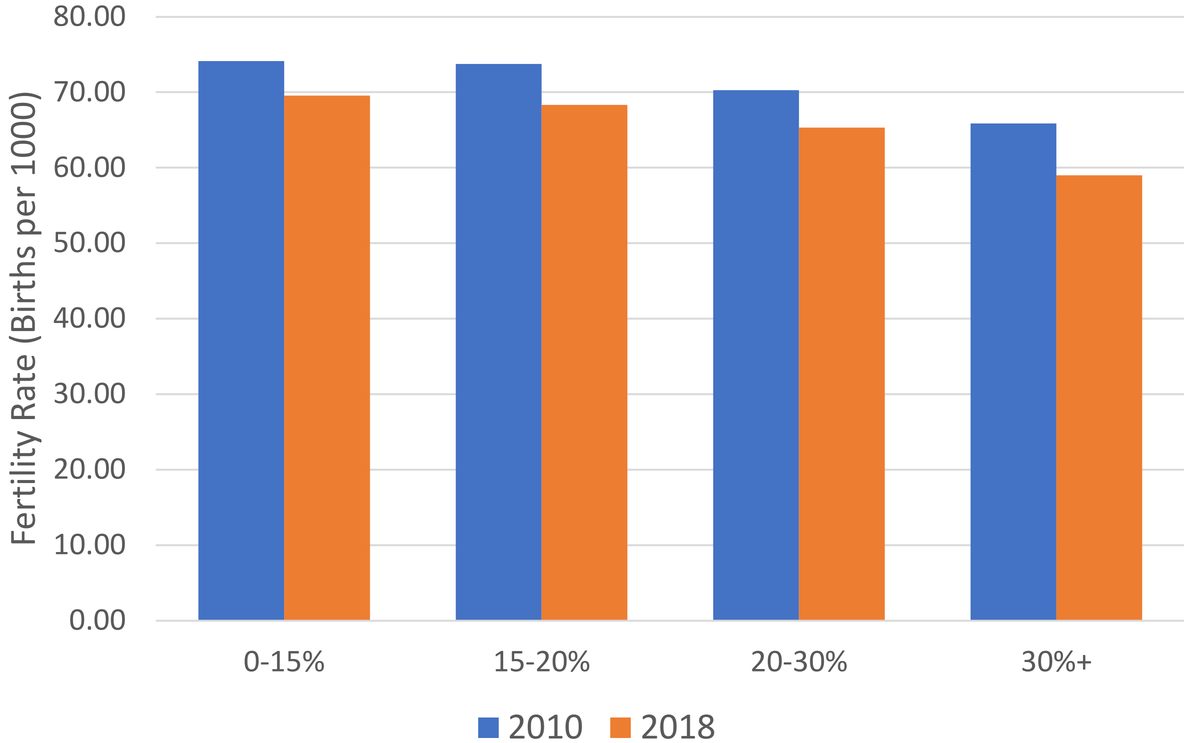


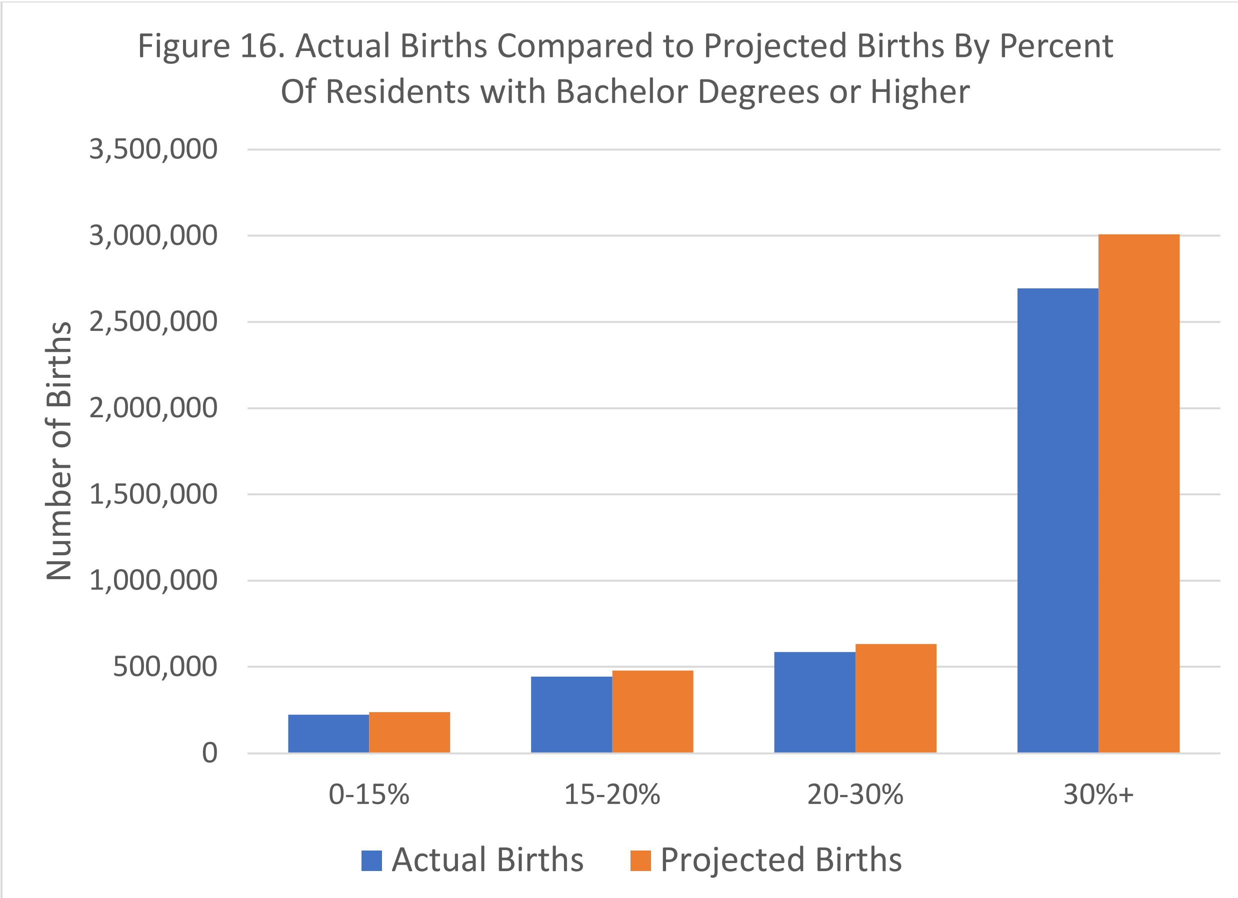
Figure 14. Actual 2018 Births Compared to Projected Births By County Median Household Income
Number of Births
2,000,000
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
$0-35,000
$35,000-45,000
$45,000-55,000
$55,000+
Actual Births
Projected Births

Figures 13 through 16 describe the SES variables used in the study, median household income and percentage of residents that have a college degree. Figure 13 demonstrates how fertility rates changed based on median household income. In 2010, fertility rate remained relatively similar among counties when stratified by median household income. The wealthiest counties, with a median income of $55,000 and higher had the lowest fertility rate at 66.2 births per thousand. These counties then suffered at 11.2% decline in fertility by 2018, lowering to a rate of 58.8. Many of these wealthier counties are in urban areas, which experienced more fertility decline in comparison to rural counties. The poorest counties, those with a median household income of $35,000 or lower, experienced the biggest drop in fertility. These counties experienced a 14.3% drop in fertility, fertility rates fell from 68.1 in 2010 to 58.4 by 2018. These poor counties had a 20.4% decline in births during that time period, while also seeing the population of women of childbearing age decline by 7.1%. The wealthier counties saw an increase of 3.7% of their childbearing aged women.

Figure 14 shows the gap in lost births across median household income. Despite the poorest counties having the highest decline in fertility rates, the richest counties have the highest population of women of childbearing age, leading to the greater number of lost births. The wealthiest counties experienced 201,749 lost births a year in the comparison of the two sets of ACS data. Lost births were similarly greater for the $45,000-55,000 group (107,765) than the $35,000-45,000 group (70,392) due to more women living in the wealthier counties. While the poorest counties experienced the largest drop in fertility, this does not have a large impact in the lost births across the country. There were more poorer counties (N=636) than the wealthy counties (N=439). The wealthy counties had a population of 26.3 million childbearing age women in 2010, while the poorest counties had a population of 3.6 million. Any change to the fertility rate in wealthier counties are going to have a greater impact on the overall fertility of the country. Additionally, a smaller generational cohort in America would more likely be the result of fewer births in the wealthy counties as opposed to the poorest counties.

Figure 15. 2010 and 2018 Fertility Rate by Percent of Residents with a Bachelor Degree or Higher





Figures 15 and 16 sort the data by the percentage of residents in a county that have obtained a college degree or higher. The most educated counties (30% or more residents with a college degree) experienced the largest decline in fertility rate. The decline in fertility is a result of both a decline in actual number of births (7.2%) and an increase in the number of women that are childbearing age (3.6%) This resulted in a fertility rate decline of 10.4% in the most educated counties. These highly educated counties tend to be in urban areas, and additionally are wealthier counties. The poorest counties experienced the biggest decline in number of births at 11.6%, but also experienced a 5.8% decline in women that are childbearing age. The poorest counties had fertility rates drop from 74.1 to 69.6 births per thousand, a 6.2% decline in fertility rate.

313,234 lost births came from the most educated counties in 2018. Many of the 833 counties that fall within the most educated counties are large metropolitan areas, as 45.7 million women of child-bearing age reside in these counties, more than the rest of the education groups combined. The highly educated counties were the only group to experience a significant increase in the population of women of child-bearing age, with a gain of 3.6%. In contrast, counties with 0-15% and 15-20% with college degrees experienced drops in women of childbearing age (-5.8% and -2.6%), while the counties with 20-30% college educated had their population stay constant, with an increase of .01%.

Across this analysis there is widespread declines in fertility. When analyzing for region, race, USDA economic dependency typology, urban/rural split, education and income, every grouping experienced decline in fertility. The total number of births across the country is declining despite an increase in women of childbearing age. However, fertility is not impacted by single variables, but rather by the overall impact of all the variables analyzed so far. The following multivariate analysis provides a deeper understanding of how the decline in fertility is occurring.

Multivariate Analysis

Table 1.1: Multi-Model Regression Analysis for 2010 Fertility

	Model 1				Model 2			
	B	SE	β	p	B	SE	β	Sig
Constant	70.361	0.002		0.000	75.528	0.003		0.000
South	-0.827	0.002	-0.031	0.000	-1.120	0.002	-0.041	0.000
North East	-9.068	0.002	-0.268	0.000	-8.847	0.002	-0.261	0.000
Mid West	-1.450	0.002	-0.046	0.000	-1.906	0.002	-0.060	0.000
ref: West								
Big Metro					-6.139	0.003	-0.235	0.000
Small Metro					-4.214	0.003	-0.149	0.000
Adjacent					-3.762	0.004	-0.087	0.000
ref: Nonadjacent								
Farming								
Manufacturing								
Mining								
% White								
% Black								
% Hispanic								
Median Income (1000s)								
% College Grad								
Adjusted R^2	0.062				0.075			

Table 1.2: Multi-Model Regression Analysis for 2010 Fertility

	Model 3				Model 4				Model 5			
	B	SE	β	p	B	SE	β	p	B	SE	β	p
Constant	73.579	0.004		0.000	64.101	0.010		0.000	66.121	0.012		0.000
South	-1.687	0.002	-0.062	0.000	-1.964	0.002	-0.073	0.000	-1.574	0.002	-0.058	0.000
North East	-8.673	0.002	-0.256	0.000	-7.344	0.002	-0.217	0.000	-6.754	0.002	-0.199	0.000
Mid West	-2.117	0.002	-0.067	0.000	-0.577	0.003	-0.018	0.000	0.410	0.002	0.013	0.000
ref: West												
Big Metro	-4.330	0.003	-0.165	0.000	-6.449	0.003	-0.246	0.000	-5.719	0.004	-0.219	0.000
Small Metro	-2.433	0.003	-0.086	0.000	-3.501	0.003	-0.124	0.000	-2.812	0.003	-0.099	0.000
Adjacent	-2.808	0.004	-0.065	0.000	-3.198	0.004	-0.074	0.000	-4.124	0.004	-0.095	0.000
ref: Nonadjacent												
Farming	9.019	0.006	0.079	0.000	9.027	0.006	0.079	0.000	7.599	0.006	0.066	0.000
Manufacturing	1.695	0.003	0.036	0.000	2.494	0.003	0.054	0.000	0.679	0.003	0.015	0.000
Mining	8.269	0.004	0.116	0.000	7.499	0.004	0.106	0.000	6.860	0.004	0.097	0.000
% White					0.076	0.000	0.128	0.000	0.032	0.000	0.053	0.000
% Black					0.167	0.000	0.164	0.000	0.182	0.000	0.179	0.000
% Hispanic					0.223	0.000	0.279	0.000	0.165	0.000	0.206	0.000
Median Income (1000s)									0.267	0.000	0.286	0.000
% College Grad									-0.435	0.000	-0.369	0.000
Adjusted R^2	0.094				0.124				0.18			

Three multi-model regressions were run, one for 2010 fertility, 2018 fertility and fertility change. The first five models of each regression use identical independent variables. Model 1 introduces dummy variables in South, Northeast and Midwest to demonstrate regional differences, with the excluded category being the West. Model 2 adds the urban rural continuum variables using dummy variables to represent Big Metropolitan, Small Metropolitan and Nonmetropolitan Adjacent counties, with Nonmetropolitan Nonadjacent as the excluded category in the model. Model 3 adds the USDA economic typology variables farming, mining and manufacturing. The USDA variables for government, recreation, nonspecialized and retirement destinations were removed from regression models because they contributed no significant effect to the model. The race variables are introduced in Model 4, including variables for the percentage of the county population that is White, Black, and Hispanic. The SES variables for median household income and residents with a college degree are added in Model 5. For the regressions analyzing 2018 fertility and fertility change, a sixth model adds 2010 fertility as an independent variable. These models are also weighted by total county population in 2010. This is a result of small rural counties having massive fluctuations in their fertility change variable. For example, Sierra County, California had a fertility rate of 6.83 (3 births) in the 2010 dataset, and a 2018 fertility rate of 28.09 (10 births), creating a fertility change of 311.40%. The weight by total county population prevents smaller counties from skewing the overall data set.

Table 1 shows the regression analysis for predicting 2010 fertility. In the final model, the independent variables were able to explain 18% of the variance of fertility in 2010. The model is a significant predictor of fertility ($p=.000$). The variables that were causing the greatest increase in fertility were median household income ($\beta = .286$) and Hispanic population ($\beta = .206$). North East counties ($\beta =-.199$) caused the biggest decline in the fertility among the four regions, meanwhile Big Metro counties ($\beta=-.219$) had the largest decline amongst the regions. College degree obtainment has the largest negative effect on fertility ($\beta=-.369$). Every variable used in Model 5 is significant at the $p<.001$ level.

Among the race variables, the percent White variable ($\beta=.053$) had less of an effect on fertility than percent Black ($\beta=.179$) and percent Hispanic ($\beta=.206$). When controlling for factors such as region, SES and urban/rural life, it appears that being White leads to lower fertility than it does for Blacks or Hispanics. An additional interesting finding within Model 5 is how the two SES variables have distinctly different effects on the model. The bivariate correlation between the two variables is strong at .711 ($p=.000$). When these variables Median household income has a positive effect on fertility ($\beta=.286$), while college degree attainment has a negative effect ($\beta=-.369$).

Table 2.1: Multi-Model Regression Analysis for 2018 Fertility

	Model 1				Model 2				Model 3			
	B	SE	β	p	B	SE	β	p	B	SE	β	p
Constant	60.993	0.001		0.000	68.059	0.003		0.000	65.670	0.003		0.000
South	1.961	0.002	0.074	0.000	1.234	0.002	0.047	0.000	0.661	0.002	0.025	0.000
North East	-3.859	0.002	-0.117	0.000	-3.599	0.002	-0.109	0.000	-3.373	0.002	-0.102	0.000
Mid West	4.257	0.002	0.138	0.000	3.21	0.002	0.104	0.000	2.856	0.002	0.093	0.000
ref: West												
Big Metro					-8.808	0.003	-0.344	0.000	-6.577	0.003	-0.257	0.000
Small Metro					-5.413	0.003	-0.195	0.000	-3.266	0.003	-0.118	0.000
Adjacent					-1.737	0.004	-0.041	0.000	-0.701	0.004	-0.017	0.000
ref: Nonadjacent												
Farming									12.571	0.006	0.112	0.000
Manufacturing									2.573	0.003	0.057	0.000
Mining									8.057	0.004	0.116	0.000
% White												
% Black												
% Hispanic												
Median Income (1000s)												
% College Grad												
Fertility Rate 2010												
Adjusted R^2	0.044				0.09				0.116			

Table 2.2: Multi-Model Regression Analysis for 2018 Fertility

	Model 4				Model 5				Model 6			
	B	SE	β	p	B	SE	β	p	B	SE	β	p
Constant	56.136	0.010		0.000	67.520	0.011		0.000	45.917	0.011		0.000
South	0.263	0.002	0.010	0.000	0.793	0.002	0.030	0.000	1.307	0.002	0.050	0.000
North East	-3.639	0.002	-0.110	0.000	-2.568	0.002	-0.078	0.000	-0.361	0.002	-0.011	0.000
Mid West	2.473	0.003	0.080	0.000	3.457	0.002	0.112	0.000	3.323	0.002	0.108	0.000
ref: West												
Big Metro	-6.422	0.003	-0.251	0.000	-3.383	0.004	-0.132	0.000	-1.514	0.003	-0.059	0.000
Small Metro	-3.380	0.003	-0.122	0.000	-1.591	0.003	-0.057	0.000	-0.672	0.003	-0.024	0.000
Adjacent	-0.854	0.004	-0.020	0.000	-1.736	0.004	-0.041	0.000	-0.388	0.003	-0.009	0.000
ref: Nonadjacent												
Farming	12.306	0.006	0.110	0.000	10.460	0.006	0.093	0.000	7.977	0.006	0.071	0.000
Manufacturing	2.652	0.003	0.058	0.000	0.539	0.003	0.012	0.000	0.317	0.002	0.007	0.000
Mining	7.898	0.004	0.114	0.000	6.803	0.004	0.098	0.000	4.562	0.004	0.066	0.000
% White	0.104	0.000	0.178	0.000	0.006	0.000	0.010	0.000	-0.005	0.000	-0.008	0.000
% Black	0.089	0.000	0.090	0.000	0.022	0.000	0.022	0.000	-0.037	0.000	-0.038	0.000
% Hispanic	0.125	0.000	0.160	0.000	-0.007	0.000	-0.009	0.000	-0.061	0.000	-0.078	0.000
Median Income (1000s)					0.201	0.000	0.221	0.000	0.114	0.000	0.125	0.000
% College Grad					-0.496	0.000	-0.431	0.000	-0.354	0.000	-0.308	0.000
Fertility Rate 2010									0.327	0.000	0.334	0.000
Adjusted R^2	0.12				0.194				0.285			

Table 2 uses the same variables present in Table 1 and introduces a sixth model adding Fertility 2010 as an independent variable. Model 5 of Table 2 can explain 19.4% of the variance in fertility. The model is a significant predictor of fertility (p=.000). Variables that had the largest effect of fertility in 2018 were median household income (β = .221) and the Mid-West region (β = .112). Amongst the USDA economic typologies the mining communities had the largest standardized coefficient (β = .098). The variable that caused the biggest decline to the 2018 fertility rate is the big metropolitan areas (β = -.059). Like the 2010 fertility model, the Northeast region has a negative effect on fertility (β = -.078).

The race variables had a smaller effect on the fertility rate in 2018 than in 2010. Most notably, the Hispanic variable now has a negative effect on fertility (β = -.009). The impact that the White (β = .010) and Black (β = .022) is also lower than they were in the 2010 fertility data. The explained variability is only raised slightly (.116 to .12) in the 2018 Fertility regression when the race variables were added in Model 4. Earlier in the descriptive data, Figure 11 highlighted how fertility declined across all racial categories. Any analysis of the 2018 fertility regression indicates that other changes in fertility by race could largely be explained by the SES variables. When the SES variables were added to the regression in Model 5, the co-efficient of the race variables were all reduced greatly.

The variable that had the most significant impact on 2018 fertility is 2010 fertility (β = .334). When introduced in Model 6, the explained variability rose from 19.4% to 28.5%. This is no surprise, while fertility declined across much of the country, those counties that had high fertility in 2010 still had relatively high fertility in 2018. Several variables had their co-efficient shift significantly with the inclusion of the fertility 2010 variable, including the White and Black variables shifting from positive to negative coefficients.

Table 3.1: Multi-Model Regression Analysis for Fertility Change

	Model 1				Model 2				Model 3			
	B	SE	β	p	B	SE	β	p	B	SE	C	p
Constant	-9.368	0.002		0.000	-7.469	0.004		0.000	-7.909	0.004		0.000
South	2.789	0.002	0.097	0.000	2.354	0.002	0.082	0.000	2.348	0.002	0.082	0.000
North East	5.209	0.002	0.145	0.000	5.248	0.002	0.146	0.000	5.3	0.002	0.148	0.000
Mid West	5.707	0.002	0.171	0.000	5.117	0.002	0.153	0.000	4.973	0.002	0.149	0.000
ref: West												
Big Metro					-2.669	0.004	-0.096	0.000	-2.247	0.004	-0.081	0.000
Small Metro					-1.199	0.004	-0.04	0.000	-0.833	0.004	-0.028	0.000
Adjacent					2.025	0.004	0.044	0.000	2.107	0.004	0.046	0.000
ref: Nonadjacent												
Farming									3.552	0.007	0.029	0.000
Manufacturing									0.878	0.003	0.018	0.000
Mining									-0.213	0.004	-0.003	0.000
% White												
% Black												
% Hispanic												
Median Income (1000s)												
% College Grad												
Fertility Rate 2010												
Adjusted R^2	0.024				0.034				0.036			

Table 3.2: Multi-Model Regression Analysis for Fertility Change

	Model 4				Model 5				Model 6			
	B	SE	β	p	B	SE	β	p	B	SE	β	p
Constant	-7.965	0.011		0.000	1.399	0.013		0.000	45.917	0.011		0.000
South	2.227	0.003	0.078	0.000	2.367	0.003	0.083	0.000	1.307	0.002	0.046	0.000
North East	3.706	0.003	0.103	0.000	4.186	0.003	0.117	0.000	-0.361	0.002	-0.010	0.000
Mid West	3.050	0.003	0.091	0.000	3.047	0.003	0.091	0.000	3.323	0.002	0.099	0.000
ref: West												
Big Metro	0.027	0.004	0.001	0.000	2.337	0.004	0.084	0.000	-1.514	0.003	-0.055	0.000
Small Metro	0.121	0.004	0.004	0.000	1.221	0.004	0.041	0.000	-0.672	0.003	-0.022	0.000
Adjacent	2.343	0.004	0.051	0.000	2.388	0.044	0.052	0.000	-0.388	0.003	-0.008	0.000
ref: Nonadjacent												
Farming	3.279	0.007	0.027	0.000	2.861	0.007	0.023	0.000	7.977	0.006	0.065	0.000
Manufacturing	0.158	0.003	0.003	0.000	-0.140	0.003	-0.003	0.000	0.317	0.002	0.006	0.000
Mining	0.399	0.004	0.005	0.000	-0.057	0.004	-0.001	0.000	4.562	0.004	0.061	0.000
% White	0.028	0.000	0.044	0.000	-0.026	0.000	-0.041	0.000	-0.005	0.000	-0.007	0.000
% Black	-0.077	0.000	-0.072	0.000	-0.160	0.000	-0.148	0.000	-0.037	0.000	-0.035	0.000
% Hispanic	-0.098	0.000	-0.115	0.000	-0.172	0.000	-0.203	0.000	-0.061	0.000	-0.072	0.000
Median Income (1000s)					-0.065	0.000	-0.066	0.000	0.114	0.000	0.115	0.000
% College Grad					-0.061	0.000	-0.049	0.000	-0.354	0.000	-0.283	0.000
Fertility Rate 2010									-0.673	0.000	-0.635	0.000
Adjusted R^2	0.057				0.062				0.393			

Table 3 is the regression analysis for the fertility change that occurred from 2010 to 2018. The explained variance for the dependent variables in Model 5 is .062. The inclusion of fertility 2010 (β = 0.673) as a variable changed the explained variance to .393. This is to be expected, as throughout the descriptive data analysis the variables with the highest fertility experienced the greatest declines in fertility. In Model 5 of this regressions, before fertility 2010 is included, all the region and metropolitan variables had a positive standardized coefficient value, while the continuous variables all had negative standardized coefficients. North East counties had the largest positive standardized coefficient for fertility change. (β = .117). As mentioned in Figure 5, the North East experienced the least fertility decline amongst the regions. The Hispanic variable had the lowest standardized coefficient (β = -0.203).

Counties with high Hispanic populations were amongst the hardest hit from the declines in fertility, counties with a Hispanic population over 25% declined by 14.1%. After factoring in the SES variables there is something about the Hispanic communities that made them experience more fertility declines than counties with a high White or Black population. The White variable had a smaller standardized coefficient (β = -.041) than the Black variable (-.160). The data suggests the counties that were majority white experienced less fertility decline than counties with high Black and Hispanic populations. This data is consistent with findings in Table 8, where before taking other variables into account, populations with a high White population experienced less fertility decline.

The relationship of median household income and college degree obtainment in this regression table is consistent with findings in the previous regressions. In Model 5, both median income (β = -.066) and residents with college degrees (β = -.049) have negative co-efficient with fertility change. However, adding the fertility 2010 variable in Model 6 results in the co-efficient for median household income to shift to a positive coefficient (β = .115) and the college degree obtainment continues to have a negative co-efficient (β = -.283).

The independent variable in Model 5 were able to explain less of the variable in explaining fertility change (R^2 = .062) than it did on fertility 2010 (R^2 = .18) and fertility 2018 (R^2 = .194). The predictor variables for fertility were less effective for explaining the percent change in fertility across the observed time period because the fertility loss occurring across the country is universal. Fertility declines are occurring across all parts of the countries, for all races and both metropolitan and rural counties. Even if a fertility rate was high in one part of the country in 2010, it is still experiencing some decline in 2018. Given how widespread fertility declines have been throughout this paper, it is little surprise that predicting change in fertility over the period would be difficult. This finding underscores the general conclusion in this paper, that a fertility decline occurred for virtually all segments of the population in all regions of the county, across all SES groups.

DISCUSSION

Fertility is rapidly declining across the United States. From 2010 to 2018, fertility declined by 9.5%. The decline in fertility rates began in 2008, and the Great Recession accelerated these declines in fertility. These fertility declines caused a loss of over 400,000 births per year compared to the 2010 rates. These declines were evident across all observed categories, including region, race, SES status, economic types and metropolitan status. Rural counties, particularly farming counties, experienced the least fertility decline. Meanwhile, large metropolitan areas, particularly those with a high Hispanic population, encountered the biggest declines in fertility.

The most notable aspect of this drop is fertility is that it is difficult to mathematically explain what is causing this decline. For fertility rates, variables for region, metropolitan status, economic type, race and SES can explain 18% and 19.4% for 2010 and 2018 fertility. However, these same variables are only able to explain 6.5% of the change in fertility rates. Over the observed period, variables that were strong predictors of above average fertility in 2010, such as farming counties and counties in the South, remained strong indicators in 2018, even though fertility declined even in these types of counties. Meanwhile, areas that had below average fertility in 2010, such as Northeastern counties, still had below average fertility in 2018. Over the observed time period, there was a widespread drop in average fertility, and a substantial drop in fertility in the nation. This shift could indicate that fertility within the United States is fundamentally changing, and that women are likely to continue to have fewer children as part of a societal shift toward smaller families than generations prior. This data also suggests that at least some of these diminished number of births are likely to be births foregone, and that a delayed baby bump as part of the economic recovery after a period of hardship is not coming.

Studies regarding the general fertility rate and total fertility rate indicate that they are at the lowest point in United States history (Livingston 2019, Johnson 2020, Martin et al. 2019). This study contributes to the literature on fertility by demonstrating that this decline in fertility is sweeping across the country, affecting different kinds of counties. No variable analyzed in this study showed an increase in fertility rate or in number of births from 2010 to 2018.

From 1976 to 2014, it became more common for women to have 0-2 children. Meanwhile, the share of women who had four or more children born has plummeted (Livingston 2015). The decline in fertility could well represent a change in United States culture, where even smaller families becomes the norm. The trends in fertility observed in this study also shows that the total number of births in the country is declining, which has significant implications for future generations of Americans.

If this shrinking fertility is sustained the next generational cohort of Americans could be smaller than the one before. This has significant social ramifications as it could lead to school districts to close schools and raise questions about whether a shrinking workforce could support a growing retired population. The United States lacks many family friendly policies, such as paid family leave, that might boost fertility rates in the country. However, many developed nations such as Germany and Sweden that have instituted strong paid leave programs for new parents still have declining fertility rates (Tamir 2019). In congruency with the theory of demographic transition, it could mean that the United States is now firmly within Stage 4 of the theory (Tamir 2019). What this means for the future of the United States population is that it would have to rely on immigration to keep it population stable or growing.

Without an increase in immigration, the effects of lower fertility could have sweeping effects on different parts of the country. Counties with significant Hispanic populations are experiencing a rapid decline in fertility rates. If trends continue, these counties may have to grapple with closing schools. Additionally, large metropolitan counties are seeing some of the biggest declines in fertility; the number of births decline 8.1% from 2010 to 2018.

While immigration and migration will also play a big factor, a smaller generation could have a big impact on the workforce. Rural counties in particularly could experience worker shortages in the coming decades. These counties are experiencing birth declines just like metropolitan counties, however they are also seeing a shrinking population of women childbearing age, while metropolitan counties are seeing an increase. Rural counties frequently have notable portions of their young adult population move away from home. If rural counties are not able to entice their childbearing age population to stay in the counties, it could create a worker shortage with a smaller generational cohort. If immigration is restricted or reduced into the United States, population in the country will decline.

Following the route of many modern societies, the United States federal government could institute several policies to make parenting easier for young Americans across the country. Providing universal daycare could be an avenue to ensure that parents can easily integrate themselves back into the workforce while their children get a good foundational pre-education and begin building social skills (Collins 2019). Childcare centers can also serve as a socially integrating institution for parents and could potentially provide information about helpful resources that parents did not previously have access to (Small 2009). Additionally, providing government mandated fertility leave could allow both mothers and fathers to spend time with their newborn children. Having these laws diminish inequity by allowing lower income workers equal access to paid leave and childcare. Parents could be less fearful about retaliation from management over taking leave knowing that it is a government mandated law and that companies that do not comply would face repercussions for parental discrimination.

However, policy decisions alone cannot fix the declining fertility rates. They might not be enough to influence the behavior of young people to resume having children at pre-recession rates. Many people will not change their behaviors if it does not correspond to their surrounding culture (Balbo & Barban 2014). So, the culture surrounding fertility decisions will also have to change. If both policy and cultural changes are not achieved, the fertility rate in the United States could remain low in years to come.

Fertility impacts from COVID-19 will not be apparent until 2021. The Bureau of Economic Analysis announced that in Q2 2020, the GDP of the country fell 32.9 percent, the first full quarter that was affected by COVID-19 (BEA 2020). Based on fertility trends observed in this study, yet another drop in fertility will likely occur due to economic hardships. With no end to the pandemic currently in sight, it is likely that another recession could occur from COVID-19. With fertility rates not yet recovered from the 2008 Great Recession, further declines in fertility could create a significantly smaller generational cohort in the United States. Analysis of 2021 and 2022 birth data will provide more insights into the impact of the COVID-19 pandemic and resulting economic disruption will cause another drop in fertility. Any short-term recovery in fertility to pre-recession levels, appears unlikely given the COVID-19 pandemic.

The continued decline in fertility has put the United States firmly in Stage 4 of the demographic transition theory, and immigration is what will prevent the country from entering a state of population decline. The effects of the Great Recession sped up declining fertility by diminishing the economically viable to have children for many Americans. A similar decline in fertility is evident in European countries as well (Tamir 2019).

Future research could continue to examine the causes and consequences of diminished fertility. The American Community Survey has a wide variety of variables that could expand the regression analysis. Some variables that were not included in this study that could be examined include access to health insurance, child poverty rates and marital status. While these variables might modestly improve the model, it is unlikely to lead to substantially different conclusions because variables such as race, SES, and region are closely associated with these potential variables. Fertility is a complex issue impacted by a variety of personal, social and economic factors. It is possible that this represents a cultural shift toward smaller families that is happening across the country and impacting broad parts of the population regardless of the characteristics of the county.

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